

§ 29.1517

(c) *Minimum power-on.* The minimum power-on rotor speed must be established so that it is—

- (1) Not less than the greater of—
 - (i) The minimum shown during the type tests; and
 - (ii) The minimum determined by design substantiation; and
- (2) Not more than a value determined under § 29.33 (a)(1) and (c)(1).

§ 29.1517 Limiting height-speed envelope.

For Category A rotorcraft, if a range of heights exists at any speed, including zero, within which it is not possible to make a safe landing following power failure, the range of heights and its variation with forward speed must be established, together with any other pertinent information, such as the kind of landing surface.

[Amdt. 29-21, 48 FR 4391, Jan. 31, 1983]

§ 29.1519 Weight and center of gravity.

The weight and center of gravity limitations determined under §§ 29.25 and 29.27, respectively, must be established as operating limitations.

§ 29.1521 Powerplant limitations.

(a) *General.* The powerplant limitations prescribed in this section must be established so that they do not exceed the corresponding limits for which the engines are type certificated.

(b) *Takeoff operation.* The powerplant takeoff operation must be limited by—

- (1) The maximum rotational speed, which may not be greater than—
 - (i) The maximum value determined by the rotor design; or
 - (ii) The maximum value shown during the type tests;
- (2) The maximum allowable manifold pressure (for reciprocating engines);
- (3) The maximum allowable turbine inlet or turbine outlet gas temperature (for turbine engines);
- (4) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with all engines operating;
- (5) The maximum allowable power or torque for each engine considering the power input limitations of the transmission with one engine inoperative;
- (6) The time limit for the use of the power corresponding to the limitations

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established in paragraphs (b)(1) through (5) of this section; and

(7) If the time limit established in paragraph (b)(6) of this section exceeds 2 minutes—

- (i) The maximum allowable cylinder head or coolant outlet temperature (for reciprocating engines); and
- (ii) The maximum allowable engine and transmission oil temperatures.

(c) *Continuous operation.* The continuous operation must be limited by—

- (1) The maximum rotational speed, which may not be greater than—
 - (i) The maximum value determined by the rotor design; or
 - (ii) The maximum value shown during the type tests;
- (2) The minimum rotational speed shown under the rotor speed requirements in § 29.1509(c).

(3) The maximum allowable manifold pressure (for reciprocating engines);

(4) The maximum allowable turbine inlet or turbine outlet gas temperature (for turbine engines);

(5) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with all engines operating;

(6) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with one engine inoperative; and

(7) The maximum allowable temperatures for—

- (i) The cylinder head or coolant outlet (for reciprocating engines);
- (ii) The engine oil; and
- (iii) The transmission oil.

(d) *Fuel grade or designation.* The minimum fuel grade (for reciprocating engines) or fuel designation (for turbine engines) must be established so that it is not less than that required for the operation of the engines within the limitations in paragraphs (b) and (c) of this section.

(e) *Ambient temperature.* Ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 29.1041 through 29.1049 is shown.

(f) *Two and one-half minute OEI power operation.* Unless otherwise authorized,

the use of 2½-minute OEI power must be limited to engine failure operation of multiengine, turbine-powered rotorcraft for not longer than 2½ minutes for any period in which that power is used. The use of 2½-minute OEI power must also be limited by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(g) *Thirty-minute OEI power operation.* Unless otherwise authorized, the use of 30-minute OEI power must be limited to multiengine, turbine-powered rotorcraft for not longer than 30 minutes after failure of an engine. The use of 30-minute OEI power must also be limited by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(h) *Continuous OEI power operation.* Unless otherwise authorized, the use of continuous OEI power must be limited to multiengine, turbine-powered rotorcraft for continued flight after failure of an engine. The use of continuous OEI power must also be limited by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests.

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(i) *Rated 30-second OEI power operation.* Rated 30-second OEI power is permitted only on multiengine, turbine-powered rotorcraft, also certificated for the use of rated 2-minute OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 30-second OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with Section A29.4 of appendix A of this part and Section A33.4 of appendix A of part 33. The use of 30-second OEI power must be limited to not more than 30 seconds for any period in which that power is used, and by—

(1) The maximum rotational speed which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(j) *Rated 2-minute OEI power operation.* Rated 2-minute OEI power is permitted only on multiengine, turbine-powered rotorcraft, also certificated for the use of rated 30-second OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 2-minute OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with Section A29.4 of appendix a of this part and Section A33.4 of appendix A of part 33. The use of 2-minute OEI power must be limited to not more than 2 minutes for any period in which that power is used, and by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

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(Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29-1, 30 FR 8778, July 13, 1965; Amdt. 29-3, 33 FR 971, Jan. 26, 1968; Amdt. 29-15, 43 FR 2327, Jan. 16, 1978; Amdt. 29-26, 53 FR 34220, Sept. 2, 1988; Amdt. 29-34, 59 FR 47768, Sept. 16, 1994; Amdt. 29-41, 62 FR 46173, Aug. 29, 1997]

§ 29.1522 Auxiliary power unit limitations.

If an auxiliary power unit that meets the requirements of TSO-C77 is installed in the rotorcraft, the limitations established for that auxiliary power unit under the TSO including the categories of operation must be specified as operating limitations for the rotorcraft.

(Secs. 313(a), 601, 603, 604, Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423), sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 29-17, 43 FR 50602, Oct. 30, 1978]

§ 29.1523 Minimum flight crew.

The minimum flight crew must be established so that it is sufficient for safe operation, considering—

- (a) The workload on individual crewmembers;
- (b) The accessibility and ease of operation of necessary controls by the appropriate crewmember; and
- (c) The kinds of operation authorized under § 29.1525.

§ 29.1525 Kinds of operations.

The kinds of operations (such as VFR, IFR, day, night, or icing) for which the rotorcraft is approved are established by demonstrated compliance with the applicable certification requirements and by the installed equipment.

[Amdt. 29-24, 49 FR 44440, Nov. 6, 1984]

§ 29.1527 Maximum operating altitude.

The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established.

(Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a),

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1421, 1423, 1424, and 1425); and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 29-15, 43 FR 2327, Jan. 16, 1978]

§ 29.1529 Instructions for Continued Airworthiness.

The applicant must prepare Instructions for Continued Airworthiness in accordance with appendix A to this part that are acceptable to the Administrator. The instructions may be incomplete at type certification if a program exists to ensure their completion prior to delivery of the first rotorcraft or issuance of a standard certificate of airworthiness, whichever occurs later.

[Amdt. 29-20, 45 FR 60178, Sept. 11, 1980]

MARKINGS AND PLACARDS

§ 29.1541 General.

(a) The rotorcraft must contain—

- (1) The markings and placards specified in §§ 29.1545 through 29.1565; and
- (2) Any additional information, instrument markings, and placards required for the safe operation of the rotorcraft if it has unusual design, operating or handling characteristics.

(b) Each marking and placard prescribed in paragraph (a) of this section—

- (1) Must be displayed in a conspicuous place; and
- (2) May not be easily erased, disfigured, or obscured.

§ 29.1543 Instrument markings: general.

For each instrument—

- (a) When markings are on the cover glass of the instrument there must be means to maintain the correct alignment of the glass cover with the face of the dial; and

(b) Each arc and line must be wide enough, and located to be clearly visible to the pilot.

§ 29.1545 Airspeed indicator.

(a) Each airspeed indicator must be marked as specified in paragraph (b) of this section, with the marks located at the corresponding indicated airspeeds.

(b) The following markings must be made:

- (1) A red radial line—

(i) For rotorcraft other than helicopters, at V_{NE} ; and